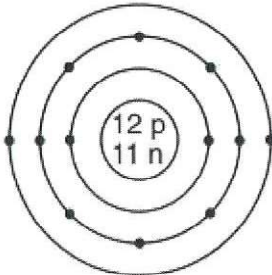
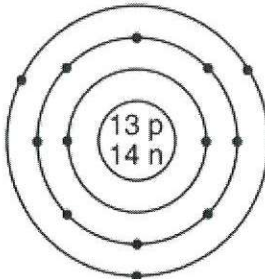


Directions: The suggested time is about 15 minutes for answering the constructed response section of the chemistry test. The parts within a question may not have equal weight. For calculations, show all your work in the spaces provided after each part. Pay particular attention to the proper use of units. Be sure your final answer is rounded to the correct number of significant figures. Make sure your work is legible. Illegible work will receive a grade of zero.

Answer the following questions related to the properties of magnesium and aluminum.

Key	Element	Lewis Electron-Dot Diagram	Electron-Shell Diagram
• = electron	magnesium	\cdot Mg \cdot	
	aluminum	\cdot Al \cdot	

- $$\frac{1L}{1S} \quad \frac{1L}{2S} \quad \frac{1L}{2p} \quad \frac{1L}{3S}$$

- $$\frac{1L}{1S} \quad \frac{1L}{2S} \quad \frac{1L}{2p} \quad \frac{1L}{3S} \quad \frac{1}{3p} \quad \frac{1}{3d}$$

The Periodic Table

- C. The table below represents the first ionization energy for the elements in Period 3. The missing first ionization energy values are 496 kJ/mol, 578 kJ/mol, 738 kJ/mol, and 789 kJ/mol. Use these values and your understanding of the trend of first ionization energy to complete the table below. [2 POINTS]

Element	Atomic Number	Symbol	First Ionization Energy (kJ/mol)
Sodium	11	Na	496
Magnesium	12	Mg	738
Aluminum	13	Al	578
Silicon	14	Si	789
Phosphorus	15	P	1012
Sulfur	16	S	1000
Chlorine	17	Cl	1251
Argon	18	Ar	1521

] Group 2/3 exception!

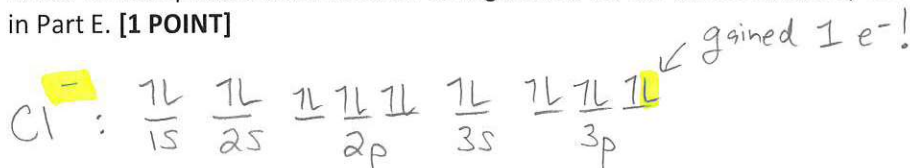
- D. Explain why the first ionization energy of sulfur is lower than that of phosphorus. [2 POINTS]

S and P have the same # of principal energy levels, and it requires less energy to remove a valence e^- from S than P b/c of the increased e^-/e^- repulsion from S's paired 3p e^- (P's 3p e^- are all unpaired).

- E. Which element from Period 3 will have the largest electronegativity? Explain. [2 POINTS]

Cl will have the largest EN in group 3, b/c it has more p^+ than any other element in that period (except Ar), so e^- in a bond would be most attracted to its nucleus (and Ar, despite having more p^+ , is a noble gas + doesn't form bonds!)

- F. Write the complete orbital electron configuration for the most commonly formed ion of the element chosen in Part E. [1 POINT]



- i. Identify one other neutral atom or ion that is isoelectronic with the most commonly formed ion of this element. [1 POINT]

